



[4910-13]

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 25

[Docket No. FAA-2013-0911; Special Conditions No. 25-539-SC]

Special Conditions: Airbus Model A350-900 Airplanes; Lateral-Trim Function through Differential Flap Setting

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final special conditions.

SUMMARY: These special conditions are issued for Airbus Model A350-900 airplanes. These airplanes will have a novel or unusual design feature associated with a lateral-trim function that deploys flaps asymmetrically for airplane lateral-trim control. This function replaces the traditional method of providing airplane lateral trim over a small range through flap and aileron mechanical rigging. The applicable airworthiness regulations do not contain adequate or appropriate safety standards for this design feature. These special conditions contain the additional safety standards that the Administrator considers necessary to establish a level of safety equivalent to that established by the existing airworthiness standards.

EFFECTIVE DATE: [Insert date 30 days after FR publication].

FOR FURTHER INFORMATION CONTACT: Robert C. Jones, FAA, Propulsion and Mechanical Systems, ANM-112, Transport Airplane Directorate, Aircraft Certification Service, 1601 Lind Avenue SW., Renton, Washington, 98057-3356; telephone (425) 227-1234; facsimile (425) 227-1320.

SUPPLEMENTARY INFORMATION:

Background

On August 25, 2008, Airbus applied for a type certificate for their new Model A350-900 airplane. Later, Airbus requested, and the FAA approved, an extension to the application for FAA type certification to November 15, 2009. The Model A350-900 airplane has a conventional layout with twin wing-mounted Rolls-Royce Trent XWB engines. It features a twin-aisle, 9-abreast, economy-class layout, and accommodates side-by-side placement of LD-3 containers in the cargo compartment. The basic Model A350-900 airplane configuration accommodates 315 passengers in a standard two-class arrangement. The design cruise speed is Mach 0.85 with a maximum take-off weight of 602,000 lbs.

On conventional airplanes, small, lateral, airplane asymmetries typically have been addressed through flap and aileron rigging (e.g., using shims). On Model A350-900 airplanes, an order for asymmetric flap deployment will be computed by the primary flight-control system as a function of the aileron position. The current airworthiness standards do not contain adequate safety standards for asymmetric use of the flaps for Airbus Model A350-900 airplanes. Special conditions are needed to account for the aspects of a function used to command an intended flap asymmetry. The lateral-trim function is intended to be performed once during climb and once during cruise to compensate for airplane small lateral asymmetries.

The lateral-trim function is not a trim-control system in the conventional sense as it has no pilot interface and is not governed by Title 14, Code of Federal Regulations (14 CFR) 25.677. Some fly-by-wire airplanes have no pilot-operated lateral trim at all. The lateral-trim function is simply an additional fly-by-wire flight-control function that nulls small roll asymmetries in certain flight phases with small, asymmetric flap deployments. Although the function operates

under normal conditions within the small range of the traditional rigging, failure cases may result in a significant out-of-range asymmetric flap condition. An asymmetry threshold protects the system against excessive flap asymmetry.

Type Certification Basis

Under 14 CFR 21.17, Airbus must show that the Model A350-900 airplane meets the applicable provisions of 14 CFR part 25, as amended by Amendments 25-1 through 25-129.

If the Administrator finds that the applicable airworthiness regulations (i.e., 14 CFR part 25) do not contain adequate or appropriate safety standards for the Model A350-900 airplane because of a novel or unusual design feature, special conditions are prescribed under § 21.16.

Special conditions are initially applicable to the model for which they are issued. Should the type certificate for that model be amended later to include any other model that incorporates the same novel or unusual design feature, the special conditions would also apply to the other model under § 21.101.

In addition to the applicable airworthiness regulations and special conditions, the Model A350-900 airplane must comply with the fuel-vent and exhaust-emission requirements of 14 CFR part 34, and the noise-certification requirements of 14 CFR part 36. The FAA must issue a finding of regulatory adequacy under § 611 of Public Law 92-574, the “Noise Control Act of 1972.”

The FAA issues special conditions, as defined in 14 CFR 11.19, under § 11.38, and they become part of the type-certification basis under § 21.17(a)(2).

Novel or Unusual Design Features

The Airbus Model A350-900 airplane incorporates the following novel or unusual design features: the asymmetric use of flaps to address lateral trim, which is not adequately addressed by § 25.701.

Discussion

Section 25.701(a) requires that, unless the airplane has safe-flight characteristics with the flaps or slats retracted on one side and extended on the other, flap and slat surfaces must be synchronized by either a mechanical interconnection or any equivalent means that has the same integrity. Synchronization is interpreted to mean that flap movement is symmetrical throughout the full range of flap motion. Because the lateral-trim function intentionally creates asymmetric flap motions, the flap-system installation of the Model A350-900 airplane does not meet the requirement of § 25.701(a) and (d).

These special conditions contain the additional safety standards that the Administrator considers necessary to establish a level of safety equivalent to that established by the existing airworthiness standards.

Discussion of Comments

Notice of proposed special conditions no. 25-13-22-SC for Airbus Model A350-900 airplanes was published in the Federal Register on January 8, 2014 (79 FR 1339). No comments were received, and the special conditions are adopted as proposed.

Applicability

As discussed above, these special conditions apply to Airbus Model A350-900 airplanes. Should Airbus apply later for a change to the type certificate to include another model

incorporating the same novel or unusual design feature, the special conditions would apply to that model as well.

Conclusion

This action affects only certain novel or unusual design features on the Airbus Model A350-900 airplanes. It is not a rule of general applicability.

List of Subjects in 14 CFR Part 25

Aircraft, Aviation safety, Reporting and recordkeeping requirements.

The authority citation for these special conditions is as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701, 44702, 44704.

The Special Conditions

Accordingly, pursuant to the authority delegated to me by the Administrator, the following special conditions are issued as part of the type-certification basis for Airbus Model A350-900 airplanes:

Lateral-trim function through differential flap setting

Current airworthiness standards, specifically § 25.701, do not contain adequate safety standards for this airplane design. In lieu of the requirements of § 25.701(a) and (d) for the lateral-trim function, the following special condition are issued:

1. Airbus must demonstrate that an unsafe condition is not created by using the flaps asymmetrically.
2. The degree of acceptable asymmetry must be defined and justified for all flight phases with respect to:
 - a. Section 25.701(b) and (c), with the worst-case asymmetric flap configurations, and

- b. Providing equivalent protection against excess asymmetry in the same manner as § 25.701 provides to systems that are synchronized, or use another equivalent means to prevent asymmetry.
- 3. This lateral-trim function is a flight-control system and therefore must be shown to comply with both general system requirements as well as general flight-control requirements. Therefore, the function must be demonstrated not to have significant latent failures, where practicable.

Issued in Renton, Washington, on July 9, 2014.

Jeffrey E., Duven
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Aircraft Certification Service

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